

## CONTENTS

## VOLUME I

## Section A

4.1	Elevation of a Lurgi Direct Heating Carbonization Plant	18
6.1	Seyler's Chassification and Fuel Chart 47B	33
9.1	The Coalfields of Great Britain	49
10.1	Diagram of Double Roll Crusher	59
11.1	Washability Curves	63
12.1	Spiral Separator	69
12.2	Chance Gravity Washer	70
12.3	Baum Jig Washer	72
12.4	Robinson's Coal Washer	73
12.5	Rheolaveur Trough Washer	74
12.6	Flow Sheet-Coal Preparation Plant	76
13.1	Hancock Efficiency Chart	79
13.2	Typical Separation effected in Practice	80
13.3	Tromp Error Curve	81
13.4	The Mayer Curve	83
13.5	Mayer Middlings Curve	85
16.1	Sprinkler Stoker in Lancashire Boiler	110
16.2	Ram Type Coking Stoker	111
16.3	Chain Grate Stoker in Lancashire Boiler	112
16.4	Underfeed Coking Stoker in Lancashire Boiler	113
17.1	Relationship between Capacity of Mill, Power, and Cost of Grinding	120
20.1	Thermosyphon Effect creating Chimney Draught	138
23.1	Coalit Process-Retort	158-159
24.1	Section through Flues and Regenerator of Regenerative coke Ove	166
26.1	Relationship between Equilibrium Moisture and Swelling Index Curve of Coals	177
29.1	Section of Bomb Calorimeter	192
30.1	Ringelmann Chart	198

**Section B**

52.1	Possible Structural Formula, Asphaltic Oil	221
53.1	A.S.T.M. Distillation Curves	226
53.2	McCabe-Thiele Diagram	231
53.3	Principle of Operation of Bubble Cap Unit	235
53.4	Atmospheric Distillation Unit	236
54.1	Thermal Cracking	239
54.2	Fluidized Catalytic Cracking	242

55.1	Flow Sheet for Production of 100 octane Aviation Gasoline	251
56.1	Relationship between T.E.L. in Iso-Octane and Performance Number	255
61.1	Temperature/Viscosity Relationships	281
62.1	Specific Gravity Bottle	286
62.2	Detail of Redwood No. 1 Viscometer	288
62.3	U-tube Viscometer	290
62.4	Pensky-Marten's Flash-point Apparatus	292
62.5	Cloud and Pour-point Apparatus	293
62.6	Dean and Stark Apparatus	297
62.7	Determination of Sediment by Extraction	298
62.8	Conradson Carbon Residue Apparatus	300
68.1	Blue flame Wick Burner	324
68.2	Pressure Burner	326
68.3	Pot Type Burner	327
69.1	Pressure Jet Burner Tip	329
69.2	Rotary cup Burner	330
69.3	Wide-range Steam Atomizer	331
70.1	Fuel Oil Storage Tank	336
70.2	Diagrammatic Layout for Fing Main System	338
71.1	Heat Losses due to Hydrogen	346
71.2	Dry Flue Gas Losses	347

## **VOLUME II**

### **Section C**

105.1	Manufacture of Ammonium Sulphate-Direct System	372
105.2	Distillation of Ammonia from Ammoniacal Liquor	373
106.1	Reaction Zones in Producer	378
107.1	Blue Water Gas Generator, showing Connectons	387
108.1	Carburettor and Supethater-Water Gas Plant	394
109.1	Composition of Crude Lurgi Gas as a Function of Pressure	401
109.2	Composition and C.V. of Purified Gas as a Function of Pressure	401
109.3	Generator of Lurgi Pressure Gasification System	402
110.1	Semet-Solvay High B.t.u. Oil Gas Plant	408
110.2	Segas Process-3 Vessel Plant	412
114.1	Dust Deposit System	427
116.1	Effect of Temperature on Explosive Limits of Methane and Air	438
116.2	Flame Speeds and Inflammability Limits for some Fuel Gases	440
117.1	Bunsen Burner	447
117.2	Fuidge Diagrams-Town Gases	451
117.3	Nomogram showing Relationship between Wobbe Number, Calorific Value and Specific Gravity	453

120.1	Principle of Operation of Wet Gas Meter	470
120.2	Principle of Cycloidal Meter or Rootes Blower	471
120.3	Principle of Dry Gas Meter	472
120.4	Simple Water-sealed Gas-holder	473
120.5	Simple Diaphragm Type Pressure Governor	475
120.6	Four-blade Exhauster	478
121.1	Boys Calorimeter	483
122.1	Orsat Gas Analysis Apparatus	487
122.2	Haldane Gas Analysis Apparatus	491
<b>Section D</b>		
152.1	Principle of Heat Pump	517
153.1	Specific Heat of Gases Concerned in Combustion	524
155.1	Carnot Cycle-T.S. Diagram	533
155.2	Carnot Cycle-P.V. Diagram	534
155.3	Otto Cycle-P.V. Diagram	534
155.4	Diesel Cycle-P.V. Diagram	535
155.5	Otto Cycle-T.S. Diagram	535
155.6	Diesel Cycle-T.S. Diagram	535
155.7	Carnot Cycle-steam, P.V. Diagram	536
155.8	Carnot Cycle-Steam, T.S. Diagram	536
155.9	Ranking Cycle-Steam, P.V. Diagram	537
155.10	Ranking Cycle-Steam, H.S. Diagram	537
155.11	Rankine Cycle-Steam, T.S. Diagram	537
155.12	Modified Rankine Cycle-Two Stages of steam Reheat and Regenerative Feed Heating	538
160.1	Sankey Diagram for Large Steam Turbine Unit	573
160.2	Mean Coal Curve-Correlation Between Carbon, Hydrogen, V.M. and C.V.-Theoretical Air Requirements	574
161.1	Tensile Strength Test Piece	579
161.2	Stress-Strength Test Piece	580
161.3	Rate of Oxidation versus Time	581
161.4	Rate of Oxidation versus Time	582
161.5	Phenomenon of Creep	583
162.1	Simplified Psychrometric Chart	589
162.2	Effect on Dewpoint of Sulphur Trioxide Concentration	590
162.3	Variation of Acid Strength with Condensing Temperature	591
162.4	Corrosion and Sulphuric Acid Deposition on Metal Surface Versus Temperature	591
163.1	Three Types of Fluid Motion	601
164.1	Pitot Tube	613
164.2	Orifice Plate	614

164.3	Venturi Meter	619
164.4	Variable Orifice Flowmeter (Rotameter)	620
164.5	Inclined Tube Manometer	622
165.1	Composite Walls-Resistances in Series	626
165.2	Composite Walls (Calculation)	627
165.3	Lagged Pipe (Calculation)	609
165.4	Variations in C with Conditions	631
165.5	Parallel Flow and Counter Flow Heat Exchangers	634
165.6	Illustrating Lambert's Law	637
167.1	Thermal Expansion of Fireclay, and Silica Bricks	657
167.2	Phase Changes in Silica Minerals	657
167.3	Melting Characteristics of Refractory Clays	658
168.1	Fuel Savings by Insulation of Structure	673
168.2	Heat Losses from steam Pipe with Different Thicknesses of Lagging	675
168.3	Most Economical Thickness of Lagging	676
169.1	Dietzsch Kiln	684
169.2	Rotary Kiln-Cement	685
169.3	State of Goods in Hoffmann Continuous Kiln	686
169.4	Types of Pottery Kilns	688
169.5	Reverberatory Furnace-Section	691
169.6	Reverberatory Furnace-Plan	691
173.1	High Efficiency Cyclone	716
173.2	Scroll Collector	718
173.3	General Arrangement-Electrostatic Precipitator	719
174.1	Simple Open Cycle Gas Turbine-Diagrammatic	725
174.2	Pressure-Volume Diagram-Brayton Cycle	726
174.3	Open Cycle-Single Stage With Heat Exchanger	730
174.4	Two-stage Gas Turbine with Heat Exchange and Inter-cooling	732
174.5	Close-cycle Gas Turbine	733
175.1	Resistance Thermometer-Wheatstone Bridge Circuit	739
175.2	Thermocouples-Three Connected to Common Recorder	740
175.3	E.M.F. of Thermocouple Metals	741
175.4	Suction Pyrometer	742
175.5	Disappearing Filament Pyrometer	743
175.6	Section through Fery Radiation Pyrometer	744
175.7	Segger Cones (after use)	745
175.8	Single Tube Manometer with Overload Device	748
175.9	Bourdon Tube Element	749
176.1	Rod and Tube Thermostat	753
176.2	Liquid Expansion Thermostat	754

176.3	Electrical Relay System	755
176.4	Pneumatic Control System	756
176.5	Pneumatic Control arranged for "Proportional-response Control"	757
177.1	Alternating Current-Sine Curve for e.m.f.	771
178.1	Vertical Waste-heat Boiler-Carburetted W.G. Plant	771
178.2	Horizontal Waste-heat Boiler-Carbruetted W.G. Plant	771
178.3	Steam Accumulator	775
180.1	Triple Effect Evaporator	792